

# Introduction: Focus and Objectives of Workshop

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During the past decade, two types of information have accumulated that provide the stimulus for this workshop: pathological and epizootiological data showing that some important food fishes in certain habitats have high prevalences of neoplasms; and analytical chemistry data showing that the edible tissues of some food fishes contain known carcinogens and/or cancer promoters in measurable, though not usually alarming quantities. Both of these types of information, coming in some instances from the same fish, have been interpreted to support a postulate, made 25 years ago, that fishes in particular locations are being exposed to anthropogenic carcinogens contaminating their environments and that certain fish species may serve as indicators of carcinogenic contaminants in aquatic habitats.

This workshop, however, will focus not on the question of fishes and other aquatic animals as indicators of carcinogens, but on the question of their possible health effects as conveyors of carcinogens to human consumers. For several years, chemists and pathologists have been asking themselves a question that is now coming back to them from the public, usually passed on and often dramatized by the news media: If one eats fish or shellfish that come from locations where these animals have high cancer prevalences, does one run an increased risk of developing cancer?

Answers to this question have been attempted by individual scientists, but have been variable, sometimes not in agreement, often couched in cautious qualifying terms, and, from the consumer's point of view, not very helpful. The most consistent and probably the most objective answer at present is: No one knows, because the information and sometimes the technology available are inadequate to make valid assessments.

Where, then, can scientists, public health workers, commercial and sport fishers, fisheries managers, and consumers go to obtain the basic information required to make an interim judgment? What investigations have been done up to now that shed at least some light on the problem? What studies have to be done to generate additional and more salient information that will make a more useful answer possible? The objective of this workshop is to address the informational needs implicit in the three questions posed. We cannot reasonably expect to arrive at a single, valid broad-spectrum risk assessment for consumers of many varieties of aquatic food supplies, taken from various habitats, in various quantities, and consumed under various conditions of culinary modification.

The subject matter of speakers must be centered upon information that deals with poikilothermic aquatic species that represent a sizeable part of the diet of a sizeable segment of the human population. In addition to this requirement, at least one, and preferably more than one, of three other criteria must apply to a food animal if it is to be of concern in this workshop. It must belong to a definable subpopulation of its kind that *a*) has been shown to have a high prevalence of neoplasms, *b*) has been shown to have higher-than-baseline levels of some carcinogen(s) or promoter(s) in its tissues, or *c*) has been taken from an aquatic environment that has been shown to have higher-than-baseline levels of carcinogens or promoters in the water column, the sediments, and/or the food chain of that species.

Criterion *c* above perhaps has minimal justification for inclusion, but at this time it must be recognized that many aquatic food species, or subpopulations of them, have not as yet been surveyed either for neoplasms or for carcinogen content, even though these animals may be known to exist in habitats determined to be highly contaminated with carcinogens. A quite massive experience in cancer biology tells us that species vary immensely in their responsiveness to chemicals, for reasons known and unknown, and that the absence of neoplasms in a given population does not necessarily mean an absence in the tissues of chemicals that may be highly carcinogenic for other species, including man. The physicochemical and biochemical kinetics that determine which precarcinogens and carcinogens work their way from water column to sediments and up a food chain, into the tissues and out again, are strongly relevant in helping one decide which species most deserve surveillance and in which types of chemically contaminated environments.

Concern for human health is the driving force behind this workshop, but actions evolving from such concern are almost always complicated by economic considerations that are often facetiously lumped together as cost/benefit value judgments. We do not intend to deal with the latter in this workshop, as they involve realms of interest and enterprise outside basic science. It is imperative to keep in mind, however, that what science discloses is often the basis for regulatory decisions made by groups, as well as dietary decisions made by individuals. It is essential that the scientific quality of the information and recommendations assembled here undergo rigorous scrutiny and selection. Weaknesses in technological capabilities and in extrapolative and inductive logic must be recognized where they exist. Within the

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constrictions that good science operates at any time point, we hope to provide within this document the information, concepts, and ideas that will allow the scientific and lay communities alike

to grasp a knowledge of what has been done on our title subject, an understanding of what remains to be done, and a sense of the priorities for future action.